IRIS

The Irish Rugby Injury Surveillance Project

School Senior & Junior Cup Rugby

2019 - 2020 Season Report

IRFU

UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

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**Report Primary Author*

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Irish Rugby Football Union Foreword

The IRFU is delighted with the second Schools Injury Surveillance Report. While each annual report gives us important information about the injuries that are occurring in the schools game, the continual collecting of data allows us to follow trends that may be developing. The information from IRIS, the Irish Rugby Injury Surveillance project, is used to decide the content of the education programmes provided through SAFE Rugby. We are also developing a programme to improve performance and enjoyment when playing the game. IRFU Engage will be available soon, and aims to increase player readiness and robustness.

We look forward to further annual reports from the University of Limerick on this project which will give us a comprehensive understanding of injuries and their trends in amateur Rugby in Ireland.

Dr Rod McLoughlin

Irish Rugby Injury Surveillance Foreword

Comprehensive injury surveillance systems in underage Rugby Union are needed to enhance player welfare and this innovative project to date has involved the research, design and implementation of an online injury recording platform. Collection has now been completed of the season's data and this second schools' 2019/20 season report documents our collaborative work with the IRFU, and with 16 school teams. Included were injury data across 125 matches from 10 School Senior Cup teams, and 64 matches from 6 School Junior Cup teams. This year's season was largely unaffected due to COVID-19 as just one Senior Cup match and one Junior Cup match was cancelled. Represented are 189 matches, over 445 players, and support from dedicated data injury recorders, coaches, doctors, physiotherapists, teachers, managers and ancillary staff within schools: thank you. This report complements the IRIS' All-Ireland League Club Rugby report 2019/20 (reported separately).

The IRIS project involves research stemming from ongoing sports performance, injury prevention and psychological preparation work by University of Limerick academics across a range of sports, as well as our specific expertise in Rugby Union. It has effectively brought together academics with expert practitioner experience from the fields of biomechanics, medicine, mathematics and statistics, physiotherapy, physiology, sport psychology, and strength & conditioning as well as three doctoral researchers. This holistic approach to injury surveillance and prevention is central to the project.

IRIS Principal Investigators
Dr. Tom Comyns, PhD
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1.0 Executive Summary

1.1 Match Injuries

Commencing in September 2019, the Irish Rugby Injury Surveillance (IRIS) project collected one full season of injury data across 125 matches from 10 School Senior Cup teams and across 64 matches from 6 School Junior Cup teams. The matches consisted of friendlies, league games and Cup games. This year's season was largely unaffected by COVID-19 as just one Senior Cup match and one Junior Cup match was cancelled.

Schools Senior Cup

- There were 10 School Senior Cup teams involved in the IRIS project for the 2019-2020 season.
- There was a total of 270 School Senior Cup players registered in the IRIS project.
- **The overall match time-loss injury incidence rate for School Senior Cup players was 42.4/1,000 player hours.**
  - This is lower than the overall match time-loss injury incidence rate reported for the Schools Senior Cup during the 2018-2019 season (67.8/1,000 player hours) [1]
- A single Senior Cup player would have to play, on average, 20 matches to sustain one injury.

Schools Junior Cup

- There were 6 School Junior Cup teams involved in the IRIS project for the 2019-2020 season.
- There was a total of 176 School Junior Cup players registered in the IRIS project.
- **The overall match time-loss injury incidence rate for School Junior Cup players was 29.2/1,000 player hours.**
  - The 2019-2020 season was the first season for IRIS School Junior Cup surveillance.
- A single Junior Cup player would have to play, on average, 34 matches to sustain one injury.

[1] The IR of 67.8/1,000 player hours for the 2018-2019 season is representative of a shorter playing season (Nov-Mar) consisting of 1663 exposure hours across 95 matches.

1.2 Training Injuries

There was a total of 28 training injuries reported in the School Senior Cup.

- This is slightly higher than the total number of training injuries (21) reported for the School Senior Cup teams in the 2018-2019 season.

There was a total of 5 training injuries reported in the School Junior Cup.

1.3 Most Frequent Injuries

Schools Senior Cup

The most commonly reported match injury diagnosis for the School Senior Cup were concussions (23%) followed by ankle sprains (10%). Concussions resulted in an average of 33 days absence from Rugby match or training activities, while ankle sprains resulted in an average of 40 days absence.

Schools Junior Cup

The most commonly reported match injury diagnoses for the School Junior Cup were concussions (21%). Concussions resulted in an average of 32 days absence from Rugby match or training activities. The second most frequent injury diagnoses were ankle sprains, wrist sprains, hip/groin strains, facial fractures and forearm fractures and each represented 7% of all time-loss match injuries.

1.4 Injury Event

The tackle event accounted for the majority of match injuries in both the Senior and Junior Cup divisions.

Schools Senior Cup

In the Senior Cup, 74% of all match injuries occurred during the tackle event. The tackler was at a slightly increased risk of injury with 55% of the tackle related injuries due to tackling as opposed to being tackled (45%). During the 2018-2019 School Senior Cup season, a lower rate (56%) of injuries occurred during the tackle. However, a similar breakdown was observed with 56% of tackle related injuries occurring to the tackler and 44% occurring to the ball carrier. The most commonly reported training injuries occurred during contact drills (61%), followed by speed drills (18%). During the 2018-2019 season, contact drills accounted for 43% and speed drills accounted for 33% of training injuries.

Schools Junior Cup

In the Junior Cup division, 79% of all match injuries occurred during the tackle event. The ball carrier and the tackler were at an equal risk of injury, each accounting for 50% of tackle related injuries. The most commonly reported training injuries occurred during contact drills (80%) followed by agility drills (20%).

1.5 Playing Position

Schools Senior Cup
Of all match injuries recorded in the Senior Cup, 72% were to the forwards (position no. 1-8), while 28% were to the backs (position no. 9-15). Second Rows (no.4&5) had the highest proportion of match injuries at 19%. In contrast, during the 2018-2019 School Senior Cup season, blindside flankers (no.6) had the highest proportion of match injuries (14%).

Schools Junior Cup
In the Junior Cup division, 43% were to the forwards (position no.1-8) while 57% were to the backs (position no. 9-15). Second Rows (no. 4&5) had the highest proportion of match injuries at 18%.

1.6 Injury Burden

The burden of an injury assesses the incidence of an injury in relation to the severity of the injury (reported as the number of days lost per 1,000 hours).

Schools Senior Cup
Concussions carried the highest injury burden (287 days per/1000h) and resulted in an average of 33 days absence from Rugby match or training activities (Graduated Return to Play Protocol requires 23 days absence). Ankle sprains and knee ligament sprains accounted for 165 and 160 days absence per 1,000h respectively.

Schools Junior Cup
Concussions also carried the highest injury burden in the Junior Cup (166 days per/1000h) and resulted in an average of 32 days absence from Rugby match or training activities (Graduated Return to Play Protocol requires 23 days absence). Forearm fractures and facial fractures also carried a high injury burden and accounted for 146 and 116 days absence per/1000h respectively.

Note: Reported concussion incidence includes suspected concussions as per IRFU recognise and remove protocol.

2.0 Introduction

2.1 The IRIS Project

The Irish Rugby Injury Surveillance (IRIS) project has developed and implemented the first long-term Rugby Union specific injury surveillance system within underage and amateur Rugby Union in Ireland. This system will monitor the incidence, type, nature and severity of both match and training injuries occurring across the amateur game in Ireland. By monitoring this information, injury trends may emerge which will aid in the development and implementation of future evidence-based injury prevention strategies in order to minimise injury risk and enhance player welfare.

IRIS Aims:

- To develop and implement an injury surveillance system for underage and amateur Rugby Union in Ireland.
- To monitor the incidence and type of injuries occurring and identify any possible injury risk factors.
- To enhance the health and welfare of Rugby Union players by using this information to assist the IRFU policy regarding injury prevention strategies.

2.2 Injury Definitions

The IRIS project follows the guidelines from the World Rugby 'Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union'[2] and the 'International Olympic Committee (IOC) consensus statement: methods for recording and reporting of epidemiological data on illness and injury in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS))'.[3]
An injury was defined as "Any physical complaint, which was caused by a transfer of energy that exceeded the body's ability to maintain its structural and/or functional integrity that was sustained by a player during a Rugby match or Rugby training, irrespective of the need for medical attention or time-loss from Rugby activities."

A recurrent injury is one of the same site and same type as the original injury and occurs within two months of the player returning to match play following the original injury.

A dual injury is one of multiple diagnoses resulting from one injury event. Dual injuries were analysed as one injury event for the purposes of calculating overall incidence and injury severity. However, when analysing injury location and nature, dual injuries were separated as per international best practice.[2 3]

Both time-loss and medical attention injuries have been monitored and analysed separately. Medical attention injuries are any injury that resulted in 0-1 days absent from Rugby match or training activities (i.e. slight injuries). Any injury that results in greater than 1 day absence from match or training activities is classed as a time-loss injury and categorised according to injury severity. Only time-loss injuries were included in injury incidence calculations.[2,3]

Injury severity is calculated as the number of days that elapsed from the date of injury to the date of the player's return to full participation in training and availability for match selection.
Injury severity is classified as;
slight (0-1 days), minimal (2-3 days), mild (4-7 days), moderate (8-28 days) and severe (>28 days).

Injury burden is reported as the number of days lost per 1,000 hours of match exposure (IR X mean severity).

Match injury data are presented as the number of injuries per 1,000 player hours of match exposure. In order to calculate match injury incidence rates, the following calculation was used:

Senior Cup Division Team match injury incidence rate (IR)[2]:

$$IR = \frac{\text{number of injuries}}{\text{number of matches x number of players (15) x match duration (1.17)}} \times 1000$$

Junior Cup Division Team match injury incidence rate (IR)[2]:

$$IR = \frac{\text{number of injuries}}{\text{number of matches x number of players (15) x match duration (1)}} \times 1000$$

[2] Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
[3] Bahr R, Clarsen B, Derman W, et al. International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). British Journal of Sports Medicine 2020;54:372-389.

2.3 Recruitment

Prior to the commencement of the 2019-2020 School Rugby season, the IRIS team recruited 11 Senior Cup teams and 6 Junior Cup teams. The IRIS project had over a 90% compliance rate for the School Senior Cup and 100% compliance for the School Junior Cup 2019-2020 season. One Senior Cup school team was excluded from data analysis due to poor compliance.

Ten Senior Cup School teams consisting of 270 players and 6 Junior Cup School teams consisting of 176 players were included in the IRIS 2019-2020 season data analysis.

Each school nominated an 'injury recorder', who was trained on use of the IRIS system during the pre-season training of the 2019-2020 season. Physiotherapists, school nurses or coaches adopted the role of injury recorder. Each injury recorder was given a secure and confidential login to their own school team's home-page on the IRIS system. Each injury recorder registered all players involved with either the Senior Cup or Junior Cup teams onto the IRIS system. Beginning with the pre-competitive season in September 2019, the injury recorder documented all injuries occurring to the Senior Cup or Junior Cup team players. The injury recorders also reported when a player returned to play so that injury severity data could be calculated.

3.0 Match Injuries

3.1 Overall Time-loss Match Injuries

Schools Senior Cup
For the 2019-2020 School Rugby season, data from 10 Senior Cup teams across 125 matches were collected. A total of 93 match time-loss injuries (any injury resulting in more than 1 days absence from Rugby match or training activities) were recorded. Any injuries resulting in 0-1 days absence from Rugby match or training activities (slight injuries) were considered to be 'medical attention injuries' and were not included in the analysis of time-loss injuries, as per international best practice.[4]

The overall team match time-loss injury incidence rates:
- School Senior Cup – 42.4/1,000 hours.
- This is approximately 1 injury occurring per school game.
- A Senior Cup School player would have to play on average, 20 matches to sustain one injury.

This IR is lower than reported for the School Senior Cup during the 2018-2019 season (67.8 per 1,000 player hours). The 2018-2019 season represented 113 injuries across 95 matches over a shorter season period (Nov-Mar) which totalled 1663 exposure hours in comparison to 2194 exposure hours for the 2019-2020 season.

Schools Junior Cup
For the 2019-2020 School Rugby season, data from 6 Junior Cup teams across 64 matches were collected. A total of 28 match time-loss injuries (any injuries resulting in 0-1 days absence from Rugby match or training activities) were recorded. Any injuries resulting in 0-1 days absence from Rugby match or training activities (slight injuries) were considered to be 'medical attention injuries' and were not included in the analysis of time-loss injuries, as per international best practice.[4]

The overall team match time-loss injury incidence rates:
- School Junior Cup – 29.2/1,000 hours.
- This is approximately 1 injury occurring per two school games.
- A Junior Cup School player would have to play on average, 34 matches to sustain one injury.

Table 1 shows the overall team match time-loss injury incidence rate for the School Senior & Junior Cup teams.

Table 1: Match time-loss injuries (excluding 'slight' injuries)

Division	No. Teams	No. Players	No. Matches	Exposure hours	No. Injuries	IR*
School Senior Cup	10	270	125	2194	93	42.4
School Junior Cup	6	176	64	960	28	29.2

***IR** – Incidence rate per 1,000 player hours.

[4] Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
Bahr R, Clarsen B, Derman W, et al. International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). British Journal of Sports Medicine 2020;54:372-389.
Williams, S., Trrewartha, G., Kemp, S & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. Sports Med, 43, 1043-55

- 26% of Senior Cup injuries and 39% of Junior Cup injuries resulted in a player being sent to the accident and emergency department for treatment.
- 15% of Senior Cup injuries and 21% of Junior Cup injuries were referred to a GP.
- 45% of Senior Cup injuries and 21% of Junior Cup injuries were referred to a Physiotherapist.
- 15% of Senior Cup injuries and 11% of Junior Cup injuries required at least 1 day's absence from school.

3.2 Match Injury Classification

The injury diagnosis refers to the specific bodily location alongside the nature of the injury.

The most common injury diagnosis for the School Senior Cup was concussions followed by ankle sprains, accounting for 23% and 10% of all time-loss match injuries respectively. In the Schools Senior Cup, there were two dual injuries which represented the diagnoses of 'concussion with a facial fracture' accounting for an incidence of 0.9 per 1,000 player hours.

The most common injury diagnosis for the School Junior Cup was concussions (21%) followed by ankle sprains, wrist sprains, hip/groin strains, facial fractures and forearm fractures each accounting for 7% of all time-loss match injuries respectively. In the Schools Junior Cup, there was one dual injury which represented a diagnoses of a 'concussion with a neck strain' and accounted for an incidence of 1.0 per 1,000 player hours.

Tables 2 and 3 show the top three match time-loss injury diagnosis for the School Senior and Junior Cup teams for the current season (2019-2020) and season one for the Senior Cup team (2018-2019).

Note: Reported concussion incidence includes suspected concussions as per recognise and remove protocol.

Table 2:[5] Overall most common injury diagnoses for the School Senior Cup; 2019-2020 vs 2018-2019 (IR/1,000 player hours, %frequency).

School Senior Cup	
2019-2020	**2018-2019**
Concussions 9.6 (23%)	Ankle Sprains 11.4 (17%)
Ankle Sprains 4.1 (10%)	Shoulder Subluxations / Dislocations 7.2 (11%)
ACJ Sprain 3.2 (7%)	Concussions 6.6 (10%)

[5] A 'concussion' refers to an injury to the brain, usually caused by a direct or indirect blow to the head.
An 'ankle sprain' refers to a tear of the ligaments located on the outside (anterior-talo-fibular (ATFL) ligament) or the inside (deltoid ligament) of the ankle joint. An ATFL sprain is the most common type of ankle sprain.
An 'ACJ sprain' (acromioclavicular joint sprain) refers to a tear of the ligaments that connect the collar bone (clavicle) to the shoulder (glenohumeral joint).
A 'shoulder subluxation/dislocation' refers to either a partial or complete separation of the upper arm bone (humerus) from the shoulder socket (glenoid fossa).

Table 3:[6] Most common injury diagnoses for School Junior Cup (IR/1,000 player hours, %frequency).

Schools Junior Cup Teams
Concussion 6.3 (21%)
Ankle Sprain / Knee Sprain / Wrist Sprain / Hip-Groin Strain / Facial fracture / Forearm fracture 2.1 (7%) **each*

The head, followed by the shoulder were the most commonly injured body locations in the School Senior Cup, accounting for 24% and 17% of all injuries respectively. Concussion injuries were the most common injury diagnosis for the head and acromioclavicular joint (ACJ) sprains were the most common injury diagnosis for the shoulder.

In the 2018-2019 School Senior Cup season, the shoulder followed by the ankle were the most commonly injured body locations, accounting for 26% and 17% of all injuries respectively.

In the School Junior Cup, the head followed by the knee and ankle were the most commonly injured body locations accounting for 21% and 11% (each) of all injuries respectively. Concussions were the primary injury diagnoses for the head while ankle sprains and knee ligament sprains were the most common injury diagnoses for the ankle and knee.

Tables 4 and 5 show the most common injury diagnoses for each commonly injured body regions.

Table 4:[7] School Senior Cup: Most common injury diagnoses with regards body location.
(IR/1,000 player hours, %frequency)

School Senior Cup	
Location	**Diagnosis**
Head 10.0/1,000 player hours (24%)	Concussion 9.6 Laceration 0.5
Shoulder 7.3/1,000 player hours (17%)	ACJ Sprains 3.2 Shoulder Subluxation / Dislocations 1.8 Rotator Cuff Strain 1.4
Knee 4.6/1,000 player hours (11%)	Knee Ligament Sprain 2.3 Bursitis 0.9 Haematoma/Contusion 0.9
Ankle 4.6/1,000 player hours (11%)	Ankle Sprain 4.1 Ankle Fracture 0.5

[6] A 'concussion' refers to an injury to the brain, usually caused by a direct or indirect blow to the head.
A 'knee sprain' refers to a tear in one of more of the collateral ligaments (ACL/PCL/MCL/LCL) of the knee joint.
A 'wrist sprain' refers to a tear of one or more of the ligaments in the wrist joint usually caused by a fall onto an outstretched arm.
A 'hip/groin' strain refers a tear or overstretch of one of the muscles or tendons at the inner thigh or front of the hip.
A 'facial fracture' refers to a break in any bones in the face e.g. jaw or nose.
A 'forearm fracture' refers to a break in any of the two bones in the forearm called the radius and ulna.

Table 5:[7] School Junior Cup: Most common injury diagnoses with regards body location.
(IR/1,000 player hours, %frequency)

School Junior Cup	
Location	**Diagnosis**
Head 5.2/1,000 player hours (18%)	Concussion 5.2
Knee 3.1/1,000 player hours (11%)	Knee Ligament Sprain 1.0 Patella Dislocation 1.0 Patella Fracture 1.0
Ankle 3.1/1,000 player hours (11%)	Ankle Sprain 2.1 Ankle Fracture 1.0

[7] A 'concussion' refers to an injury to the brain, usually caused by a direct or indirect blow to the head.A 'laceration' refers to a cut located anywhere on the body.
An 'ACJ sprain' (acromioclavicular joint sprain) refers to a tear of the ligaments that connect the collar bone (clavicle) to the shoulder (glenohumeral joint).
A 'rotator cuff strain' refers to a tear of any of the tendons that surround the shoulder joint.
A 'shoulder subluxation/dislocation' refers to either a partial or complete separation of the upper arm bone (humerus) from the shoulder socket (glenoid fossa).
A 'knee ligament sprain' refers to a tear of one or more of the collateral ligaments (ACL/PCL/MCL/LCL) of the knee joint.
A 'patella dislocation' refers to the displacement of the knee cap from its normal position.
A 'patella fracture' refers to a break in the knee cap bone.
A 'bursitis' refers to the inflammation of a bursa which is a fluid filled sac that acts as a cushion for bones, tendons and muscles. They are most commonly located in the knee, shoulder, hip and elbow.
A 'haematoma/contusion' refers to a bruise located anywhere on the body.
An 'ankle sprain' refers to a tear of the ligaments located on the outside (anterior talo-fibular (ATFL) ligament) or the inside (deltoid ligament) of the ankle joint. An ATFL sprain is the most common type of ankle sprain.
An 'ankle fracture' refers to a break in one or more of the bones in the ankle joint.

3.3 Timing of Match Injury

The highest percentage of injuries for the Senior Cup (37%) and Junior Cup (32%) teams occurred during the 3rd quarter. A small proportion of injuries occurred during match play where the exact timing of injury was unknown (0.9/1,000h in the Senior Cup and 3.1/1,000h in the Junior Cup).

During the 2019-2020 season the Senior Cup teams saw an increase in injuries in the 1st quarter and a slight decrease in the 3rd quarter when compared to 2018-2019 season. Figure 1(a) demonstrates the timing of match injury for the School Senior Cup teams comparing this season (2019-2020) to season one (2018-2019).

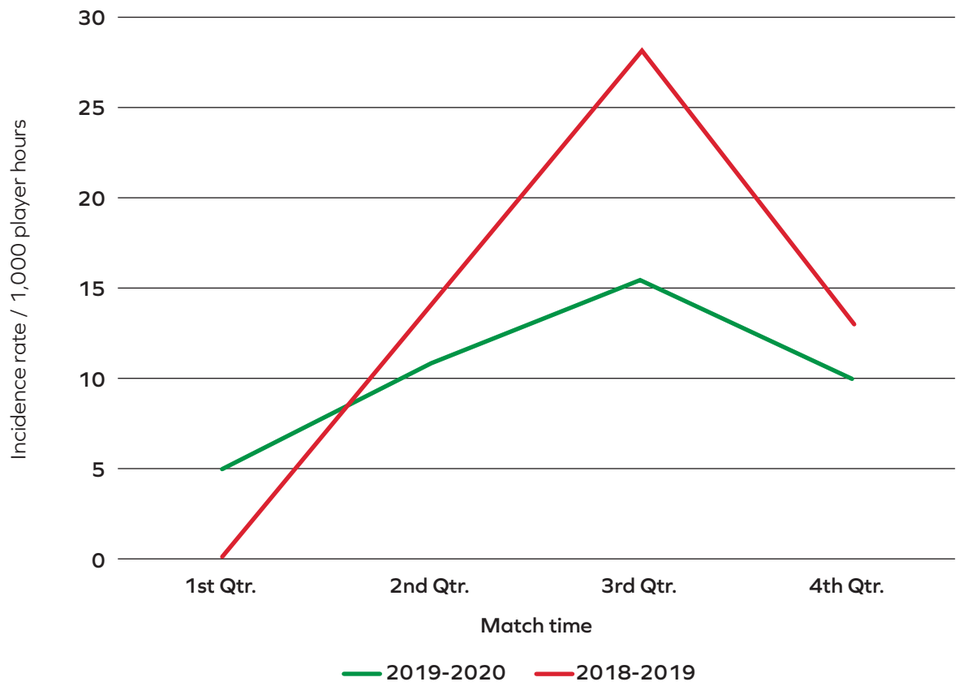

Figure 1(a): Timing of injury during match play for School Senior Cup teams (IR/1,000 player hours)

Figure 1(b) demonstrates the timing of match injury in the School Junior Cup teams.

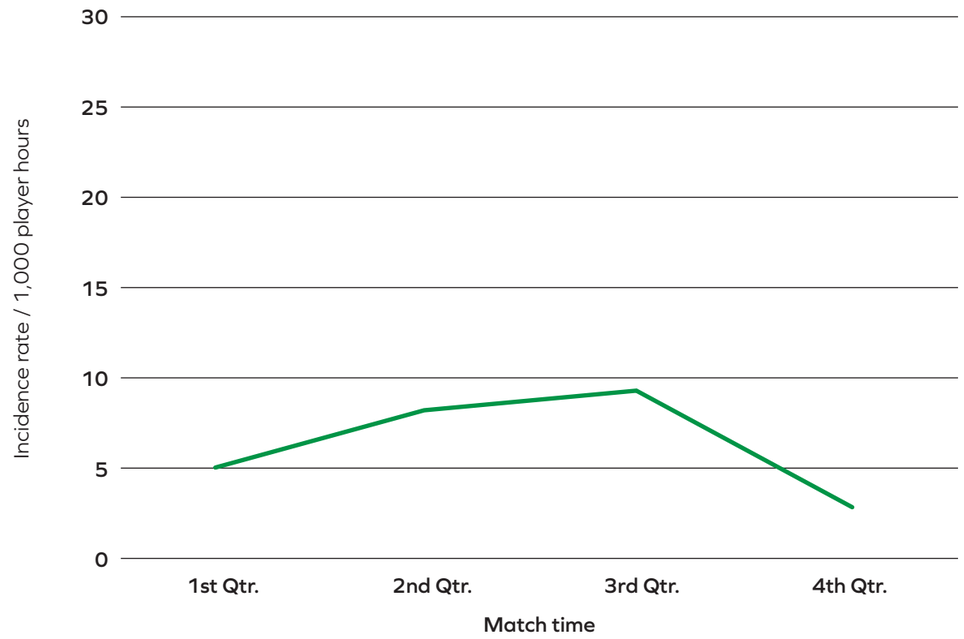

Figure 1(b): Timing of injury during match play for School Junior Cup teams (IR/1,000 player hours) for the 2019-2020 season.

3.4 Match Injury Event

Figure 2 shows the event surrounding the occurrence of an injury.

The tackle event accounted for the most common injury event across both the School Senior and Junior Cup teams. This is similar to what was reported in the 2018-2019 Season One Report, where Senior Cup teams had a slightly higher rate of injuries occurring to the tackler, compared to the ball carrier.

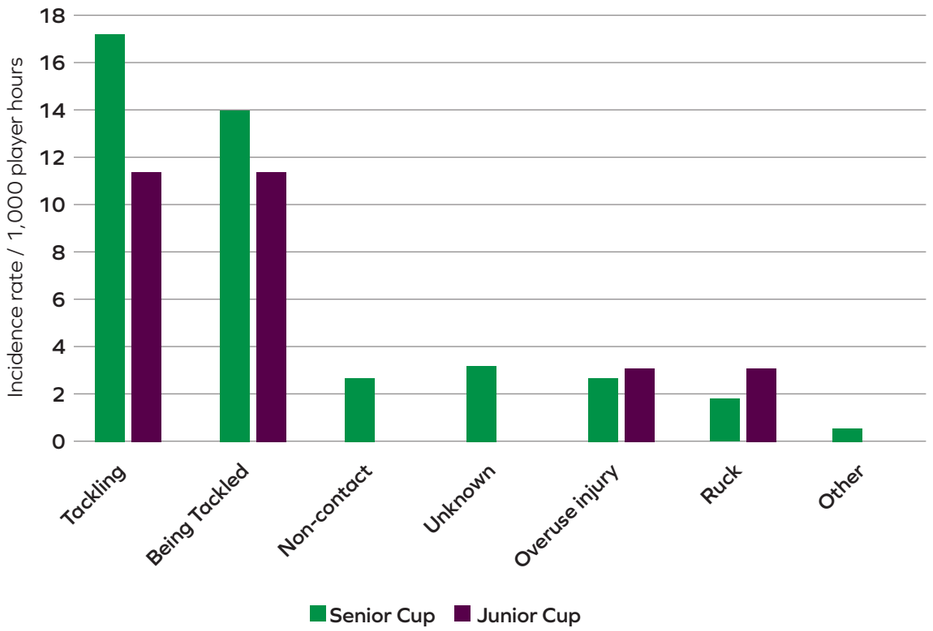

Figure 2: Match Injury event (IR/1,000 player hours)

3.5 Nature of Match Injury

The nature of injury refers to the type of injury occurring.

Ligament sprains followed by concussions were the most common injury type for the School Senior Cup teams. This is somewhat similar to Season One (2018-2019) where ligament sprains followed by muscle strains were the most common injury type for the Senior Cup teams. For the Senior Cup, 'other' injuries referred to bursal injuries and equated to an incidence rate of 1.4/1,000 player hours.

Sprains followed by fractures and concussions were the most common injury type for the School Junior Cup teams.

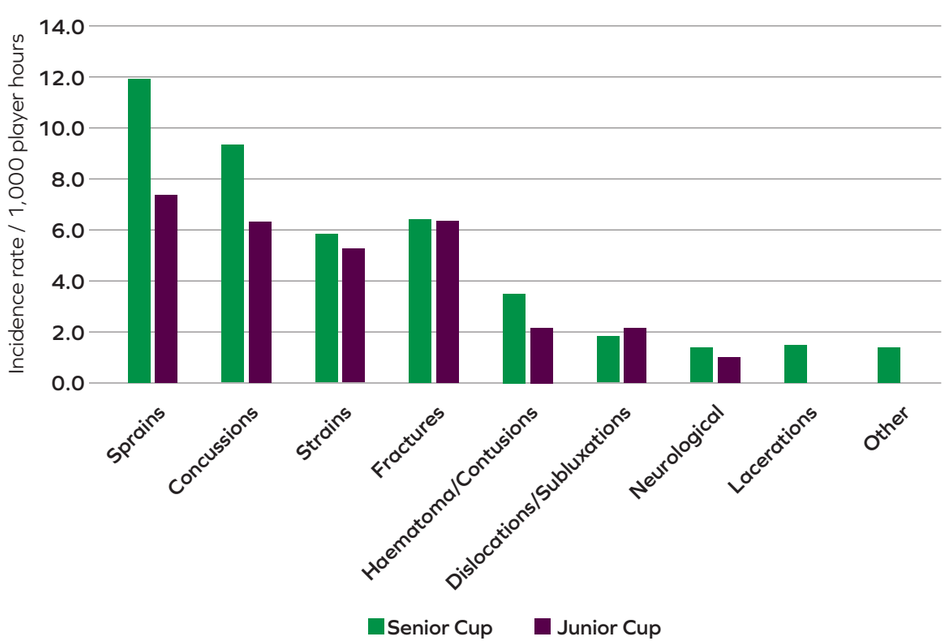

Figure 3: Match Injury nature (IR/1,000 player hours)

3.6 Body Location of Match Injury

The head was the most commonly injured body area in the School Senior Cup games accounting for 26% (10/1,000 player hours) of all injuries, a slight increase in incidence from Season One (2018-2019) where it was the third most common injury location (8.4/1,000 player hours).

The most common upper limb location of injury was to the shoulder accounting for 17% (7.3/1,000 player hours) of all injuries, a decrease from the 2018-2019 where it accounted for 26% of all injuries (17.4/1,000 player hours). The most common lower limb location of injury was the knee (11%) and ankle (11%).

Figure 4 (a) shows the incidence of injury according to bodily location for the School Senior Cup teams.

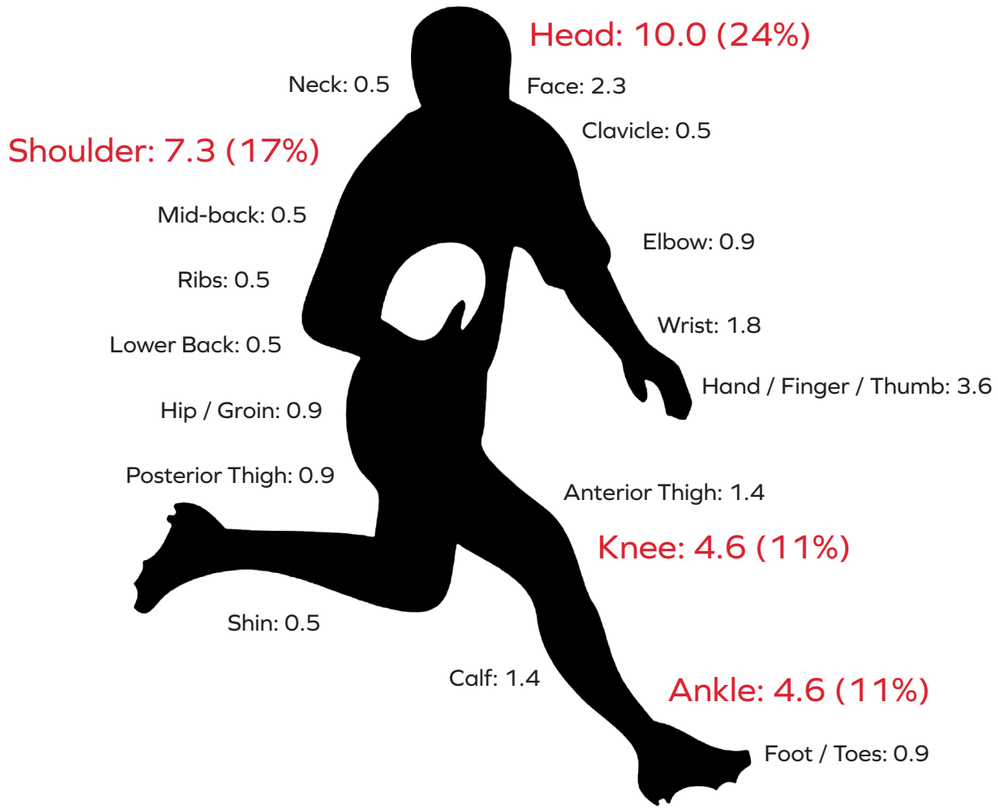

Figure 4(a): Location of match injury for the School Senior Cup (IR/1,000 player hours)

The head was the most commonly injured area in the School Junior Cup division and accounted for 21% (6.3/1,000 player hours) of all injuries. The most common lower limb injury location of injury was the ankle (11%) and the knee (11%). The most common upper limb injury location was the wrist (7%) and the forearm (7%).

Figure 4 (b) shows the incidence of injury according to bodily location for the School Junior Cup teams.

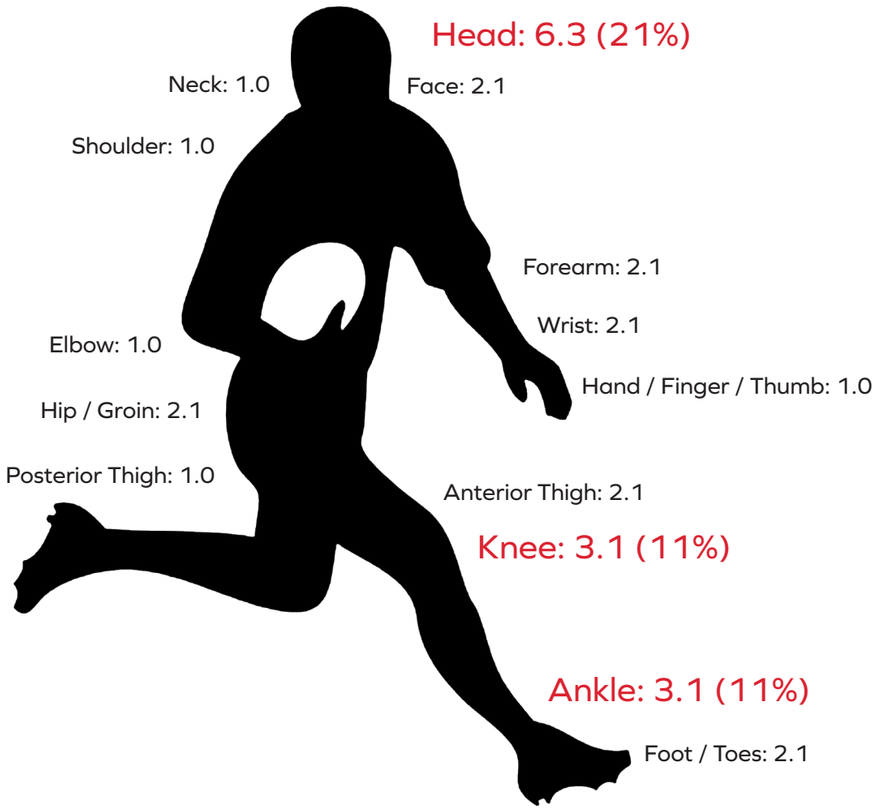

Figure 4(b): Location of match injury for the School Junior Cup (IR/1,000 player hours)

3.7 Playing Position of Match Injury

Rugby player positions are split into 'forwards' (position no. 1-8) and 'backs' (position no. 9-15).

The second row (no.'s 4 & 5) suffered the most injuries in the School Senior Cup matches (19%). The loosehead prop (no.1) and winger (no.'s 11 & 14) also suffered more injuries than any other position each accounting for 12% of injuries. In the 2018-2019 season, the blindside flanker (no. 6) suffered the most injuries (14%).

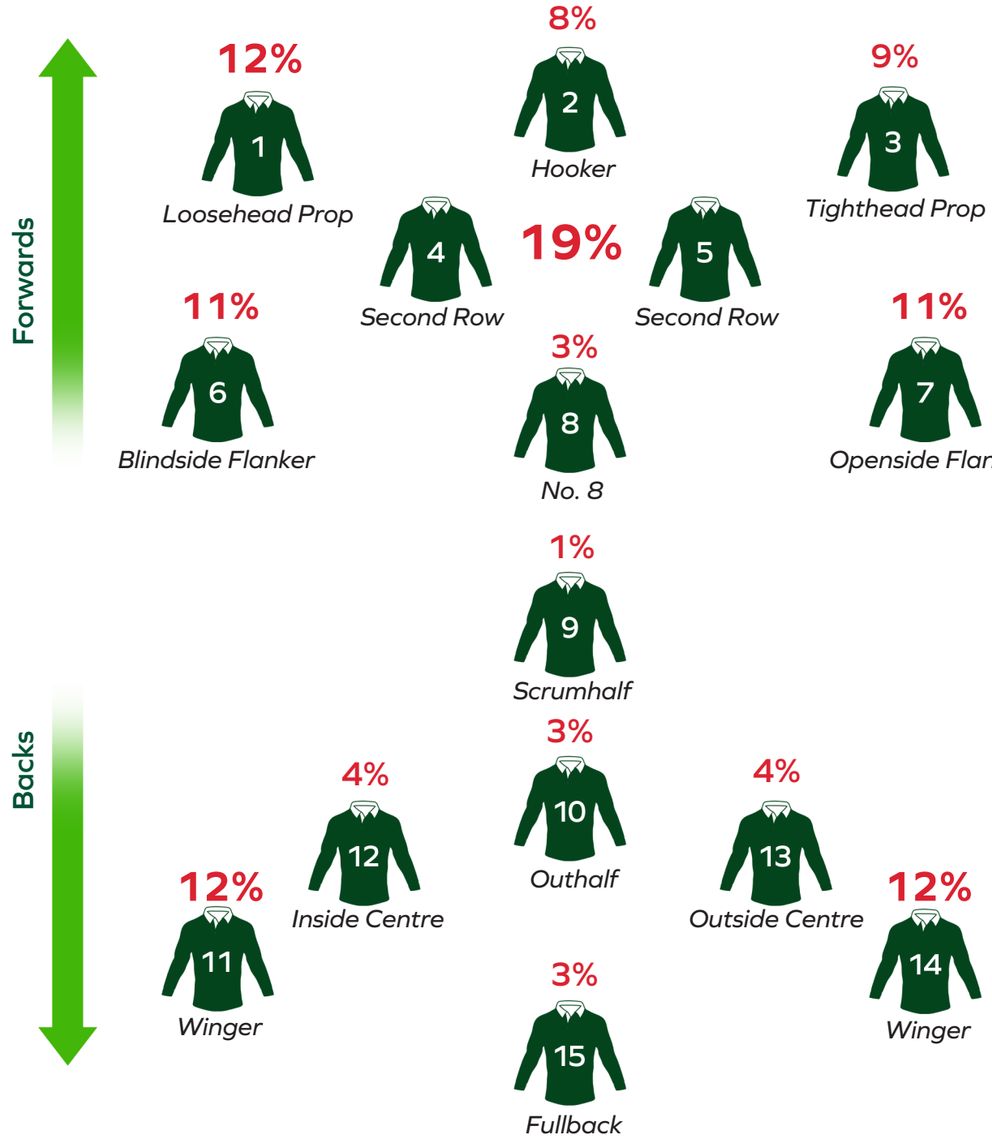

Figure 5(a):[8] Percentage of injuries occurring per playing position in the School Senior Cup

[8] Second Row and Winger positions denote respective combined percentages.

The second row (no.'s 4 & 5) suffered the most injuries in the School Junior Cup division. The scrumhalf (no. 9) and the inside centre (no. 12) also suffered more injuries than any other position in the School Junior Cup.

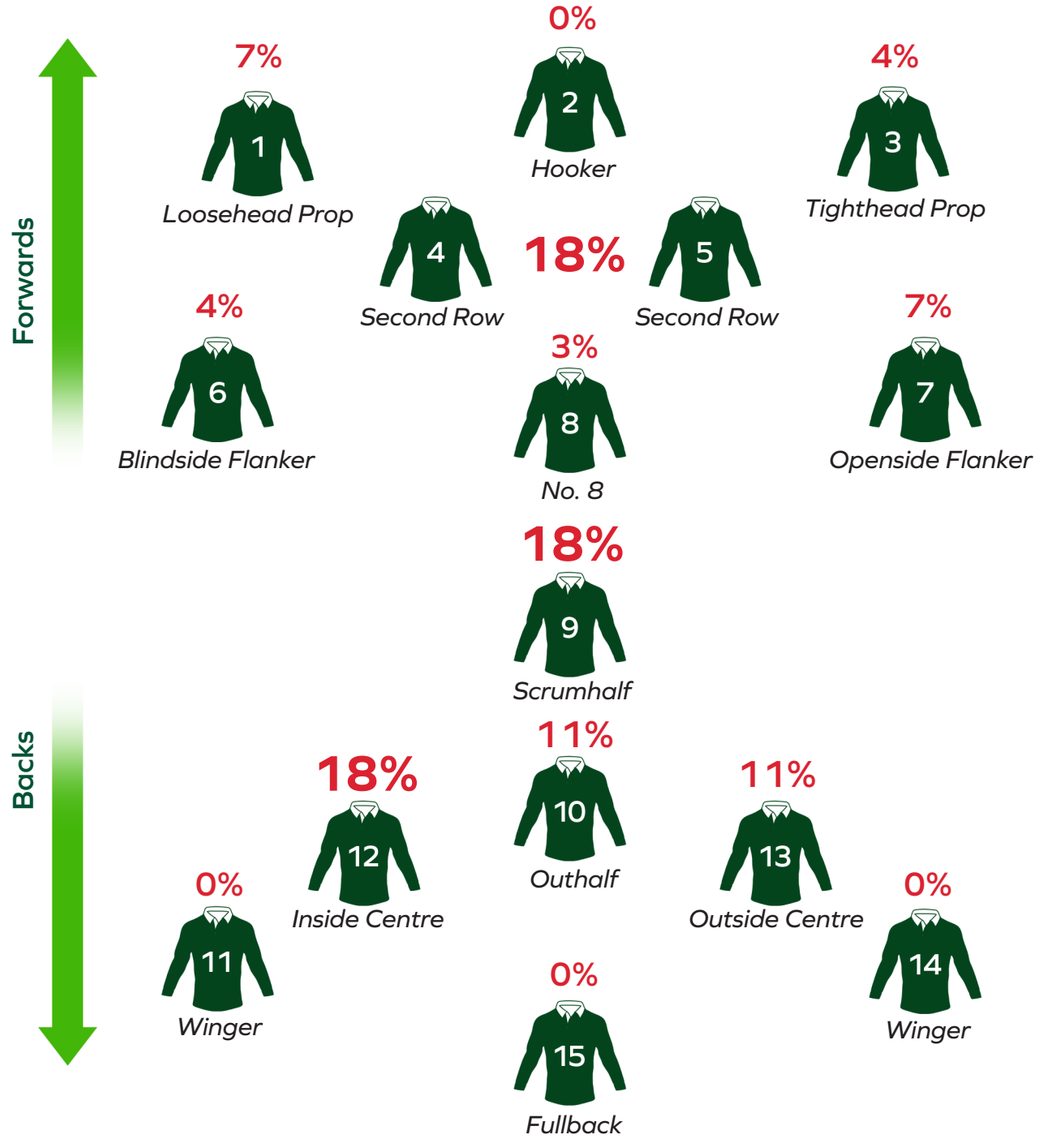

Figure 5(b):[9] Percentage of injuries occurring per playing position in the School Junior Cup

[9] Second Row and Winger positions denote respective combined percentages.

3.8 Match Injury Severity

Injury severity was calculated as total number of days absent from Rugby match or training and classified according to the World Rugby Consensus guidelines.[10] The majority of injuries were moderate or severe (resulting in greater than eight days absence), as shown in Figure 6.

Slight injuries (0-1 days absence) were considered as 'medical attention injuries' and were not included in analysis of time-loss injuries. Slight injuries are discussed in more detail in sub-section 3.[10]

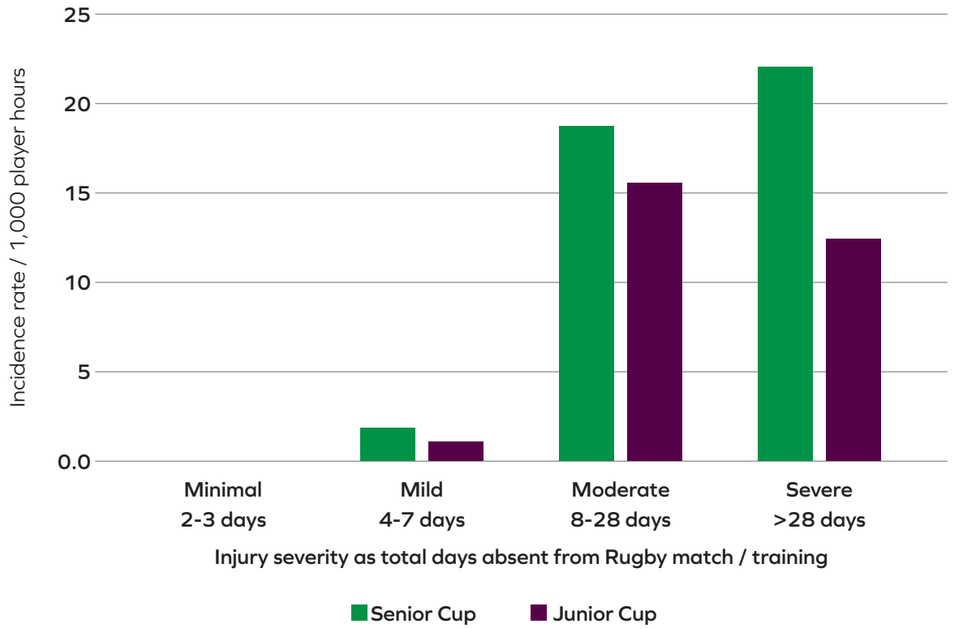

Figure 6: Injury severity of time-loss injuries (IR/1,000 player hours)

[10] Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.

3.9 Match Injury Burden (severity X incidence rate)

The burden of an injury assesses the incidence of an injury in relation to the severity of the injury (reported as the number of days lost per 1,000 hours).

Concussions carried the highest injury burden in the School Senior Cup accounting for 15% of all severe match injuries (>28 days absence) and resulted in an average of 33 days absence from Rugby match or training activities (Graduated Return to Play Protocol requires 23 days absence). During the 2018-2019 Senior Cup season, shoulder dislocations/subluxations carried the highest injury burden and accounted for 27% of all severe injuries. In comparison, shoulder dislocations accounted for 8% of all severe injuries for this season (2019-2020).

In the Senior Cup, ankle sprains and knee ligament sprains also carried a high injury burden accounting for 165 and 160 days absence per 1,000 hours respectively.

In the School Junior Cup division, concussions also carried the highest injury burden and represented 25% of all severe match injuries (>28 days absence). Concussions resulted in an average of 32 days absence from Rugby match or training activities (Graduated Return to Play Protocol requires 23 days absence). Fractures were also a common injury type in the Junior Cup division which resulted in severe injuries (in terms of total number of days absent from Rugby match or training). Forearm fractures and facial fractures also carried a high injury burden accounting for 146 and 116 days lost per 1,000 hours respectively.

Table 6:[11] Injury diagnoses, injury burden (days absence/1,000 player hours), average TDO (total days off).

	Diagnosis	Injury Burden	Average Total Days Off
Senior Cup	Concussion	287	33
	Ankle Sprain	165	40
	Knee Ligament Sprain	160	70
Junior Cup	Concussion	166	32
	Forearm Fracture	146	70
	Facial Fracture	116	56

[11] A 'concussion' refers to an injury to the brain, usually caused by a direct or indirect blow to the head.
An 'ankle sprain' refers to a tear of the ligaments located on the outside (anterior-talo-fibular (ATFL) ligament) or the inside (deltoid ligament) of the ankle joint. An ATFL sprain is the most common type of ankle sprain.
A 'knee ligament sprain' refers to a tear of one or more of the collateral ligaments (ACL/PCL/MCL/LCL) of the knee joint.
A 'forearm fracture' refers to a break in any of the two bones in the forearm called the radius and ulna.
A 'facial fracture' refers to a break in any bones in the face e.g. jaw or nose.

3.10 Medical Attention Match Injuries (slight injuries)

Any injuries resulting in 0-1 days absence from Rugby match or training are considered as slight, or 'medical attention', injuries and therefore were excluded from the analysis of time-loss injuries, as per international best practice.[12]
During the 2019-2020 School season, three medical attention (0-1 day time loss) injuries were recorded in the Senior Cup division while no medical attention injuries occurred during match play for the Junior Cup teams.

The overall incidence rate for medical attention match injuries;
- School Senior Cup: 1.4/1,000 player hours
- School Junior Cup: 0/1,000 player hours

The three medical attention injuries in the Senior Cup division were diagnosed as muscle cramp overuse injuries involving the lower limb. All three injuries occurred during the 4th quarter.

[12] Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
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Williams, S., Trewartha, G., Kemp, S. & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. Sports Med, 43, 1043-55.

3.11 Other Match-day Related Injuries

One injury occurred during the warm-up in each of the Senior and Junior Cup divisions and these were not included in the analysis of the time-loss match injury incidence, as only injuries occurring during the match play counted as match injuries.

- The School Senior Cup warm-up injury was diagnosed as a low-back muscle strain and occurred during non-contact drills in the warm up.
- The School Junior Cup warm-up was diagnosed as a nose fracture and occurred during tackle drills in the warm up.

4.0 Training Injuries

4.1 Overall Time-loss Training Injuries

For the 2019-2020 school season, training injury data from 10 School Senior Cup and 6 Junior Cup teams were also collected. For operational reasons, as the frequency and duration of training sessions were not recorded for this season, training injury incidence rates are not available. Therefore, the total number of training injuries that occurred are reported.

Any injuries resulting in 0-1 days absent from Rugby match or training activities were considered to be medical attention injuries and were not included in the analysis of time-loss injuries, as per international best practice.[13]

The overall number of training injuries for the School Senior Cup teams was 28. This is a slight increase from Season One (2018-2019) where the total number of training injuries for the School Senior Cup teams was 21. The overall number of training injuries for the School Junior Cup teams was 5.

Table 7 shows the overall number of training injuries for the School Senior Cup and Junior Cup teams.

Table 7: Training time-loss injuries (excluding slight injuries).

Division	No. Teams	No. Players	No. Injuries
Schools Senior Cup	10	270	28
School Junior Cup	6	176	5

[13] Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
Bahr R, Clarsen B, Derman W, et al. International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). British Journal of Sports Medicine 2020;54:372-389.
Williams, S., Trewartha, G., Kemp, S. & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. Sports Med, 43, 1043-55.

4.2 Training Injury Classification

The injury diagnosis refers to the specific bodily location and nature of the injury.

The most common injury diagnosis for the School Senior Cup teams was ankle sprains accounting for 21% of all training time-loss injuries. This was followed by hamstring strains accounting for 14% of all training time loss injuries. This is somewhat similar to Season One (2018-2019) where hamstring strains (19%) and ankle sprains (14%) represented the two most common training injury diagnoses.

The most common injury diagnosis for the School Junior Cup teams was ACJ (Acromioclavicular joint) sprains accounting for 40% of all training injuries.

Table 8 shows the top three training time-loss injury diagnoses for the School Senior Cup teams for the current season (2019-2020) comparing with Season One (2018-2019).

Table 9 shows the most common training time loss injury diagnoses for the School Junior Cup teams for the current season.

Table 8:[14] Overall most common injury diagnoses for the School Senior Cup teams (%frequency).

School Senior Cup	
2019-2020	**2018-2019**
Ankle Sprains (21%)	Hamstring Strains (19%)
Hamstring Strains (14%)	Ankle Sprains (14%)
ACJ Sprains (11%)	Knee Ligament Sprains / Head Lacerations / Calf Strains (10% each)

Table 9:[14] Overall most common injury diagnoses for the School Junior Cup teams (%frequency).

School Junior Cup
ACJ Sprains (40%)
Wrist fracture, Concussion, Calf Strain (20% each)

[14] An 'ankle sprain' refers to a sprain of the ligaments either on the outside (anteriortalofibular (ATFL) ligament) or the inside (deltoid ligament) of the ankle joint. An ATFL sprain is the most common type of ankle sprain.
A 'hamstring strain', refers to a tear of the muscle group located on the back (posterior aspect) of the thigh.
An 'ACJ' sprain (acromio-clavicular joint sprain) refers to a tear of the ligaments that connect the collar bone (clavicle) to the shoulder (glenohumeral joint).
A 'knee ligament sprain' refers to a tear of one or more of the collateral ligaments (ACL/PCL/MCL/LCL) of the knee joint.
A 'head laceration' refers to a cut on the head or face.
A 'wrist fracture' is a break in one or more of the bones in the wrist joint. A radius fracture is the most common type of wrist fracture.
A 'calf strain' refers to a tear of the muscle group (gastrocnemius and soleus) at the back of the lower leg.

4.3 Body Location of Training Injuries

Overall, the ankle and the shoulder were the most commonly injured sites in the School Senior Cup.

Figure 7(a) shows the frequency of injury according to bodily location for the School Senior Cup teams.

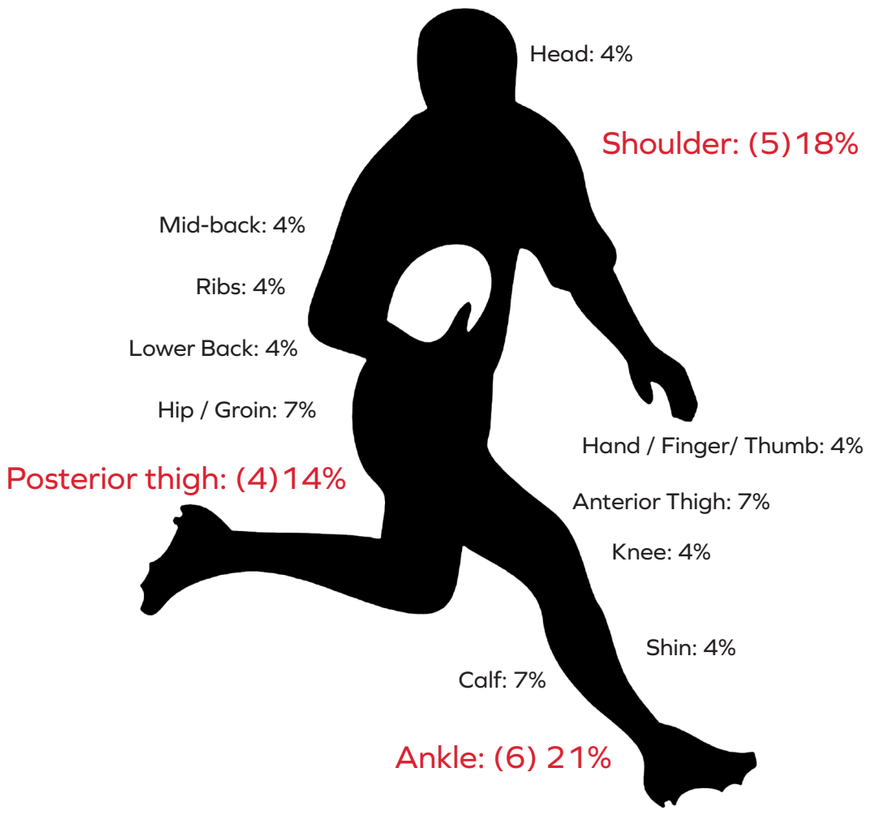

Figure 7(a): Location of training injuries for the School Senior Cup (number of injuries) % frequency.

The shoulder was the most commonly injured location for the School Junior Cup and accounted for 40% (n=2) of all training time loss injuries.

Figure 7(b) shows the frequency of injury according to bodily location for the School Junior Cup division.

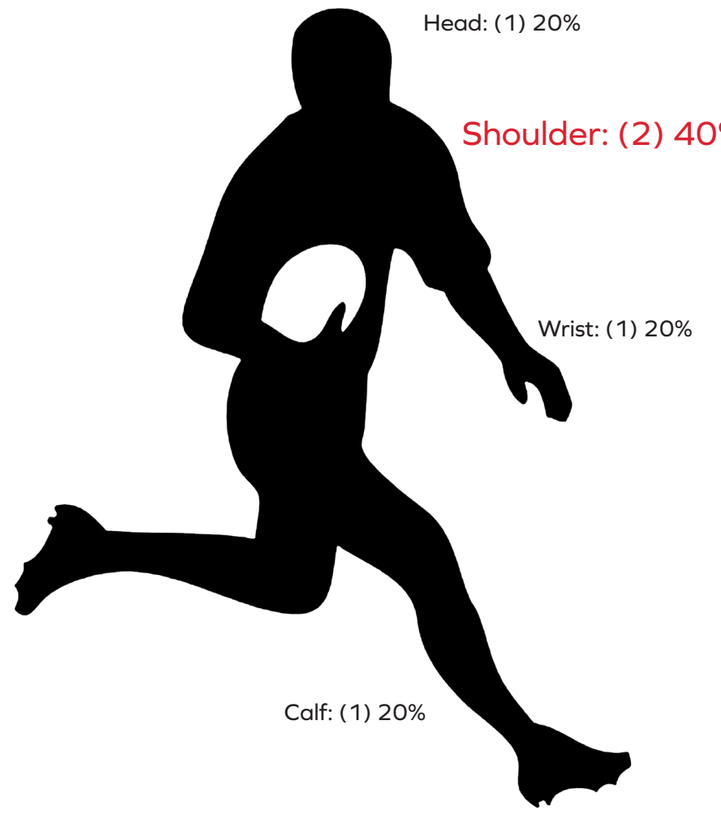

Figure 7(b): Location of training injuries for the School Junior Cup (number of injuries) % frequency.

4.4 Nature of Training Injuries

The nature of injury refers to the type of injury occurring.

Sprains (referring to ligament tears) and Strains (referring to muscle or tendon tears) were the most common training injury type across the School Senior and Junior Cup divisions. The column 'Other' for the School Senior Cup refers to a knee meniscal tear (n=1).

Figure 8 shows the nature of time loss training injuries for the School Senior and Junior Cup teams.

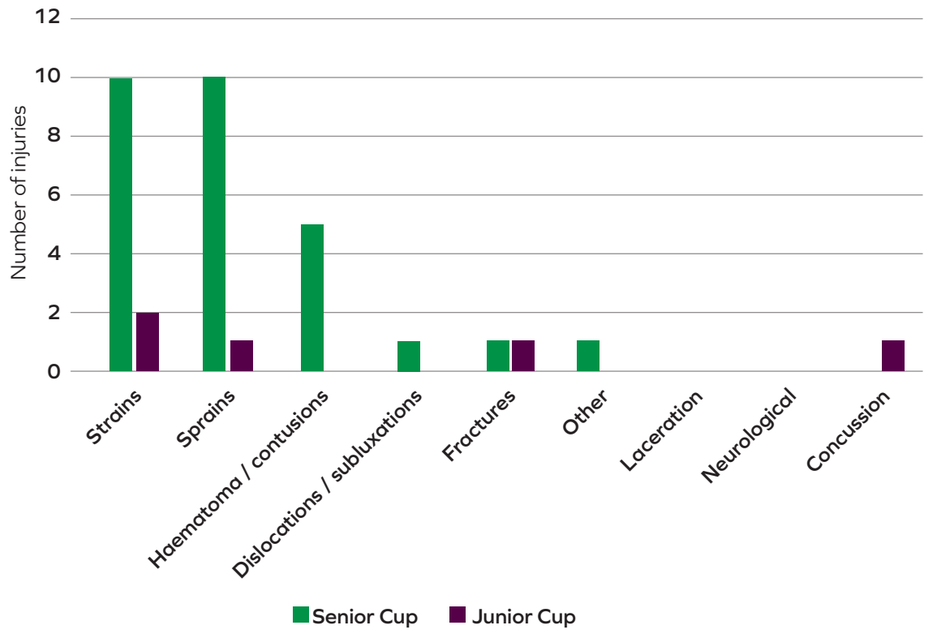

Figure 8: Nature of injury (number of injuries)

4.5 Training Injury Event

Figure 9 shows the events surrounding the occurrence of an injury for the School Senior and Junior Cup divisions.

Contact Drills was the most common cause of injury for both the Senior and Junior Cup teams accounting for 61% and 80% of time-loss training injuries respectively.

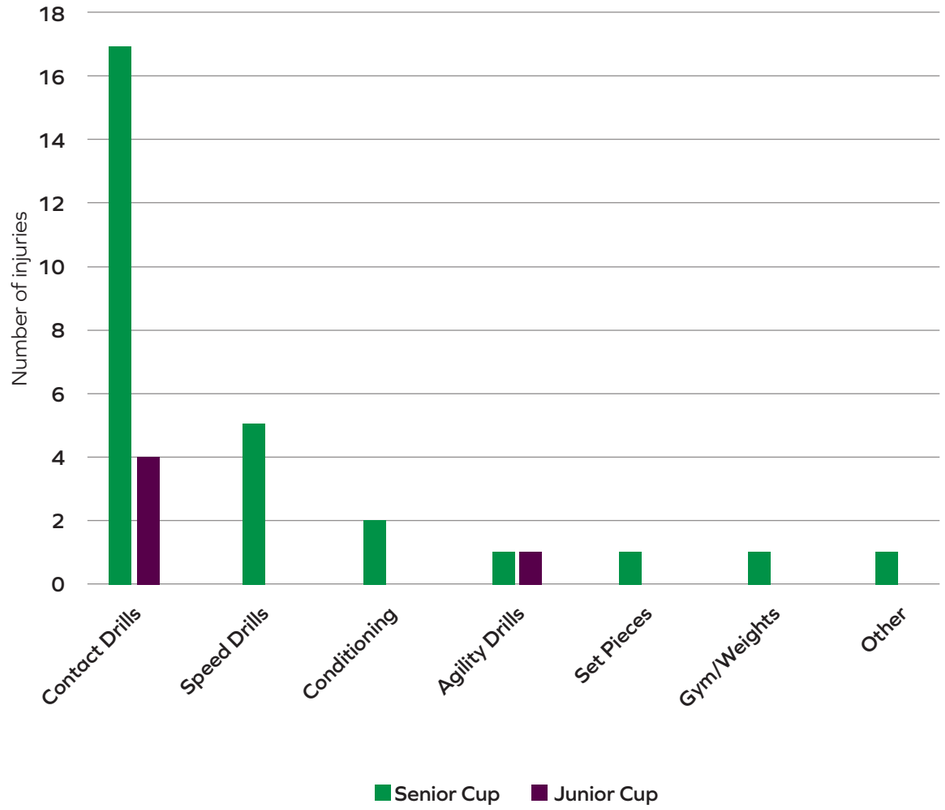

Figure 9: Training Injury event (number of injuries)

4.6 Training Injury Severity

Injury severity was calculated as total number of days absent from Rugby match or training and classified according to the World Rugby Consensus guidelines. The majority of injuries were moderate or severe (resulting in greater than eight days absent), as shown in Figure 10.

Slight injuries (0-1 days absence) were considered as 'medical attention injuries' and were not included in analysis of time-loss injuries, as per international best practice.[15] Slight injuries are discussed in more detail in sub-section 4.8.

The severity of training injuries for the School Senior Cup division followed a similar pattern to Season One (2018-2019) where the majority of time-loss training injuries were moderate (8-28 days) in terms of time loss from Rugby training or matches.

In the School Junior Cup division, 40% (n=2) of time loss injuries were moderate (8-28 days) and 40% (n=2) were severe (>28days) in terms of number of days absent from Rugby training or matches.

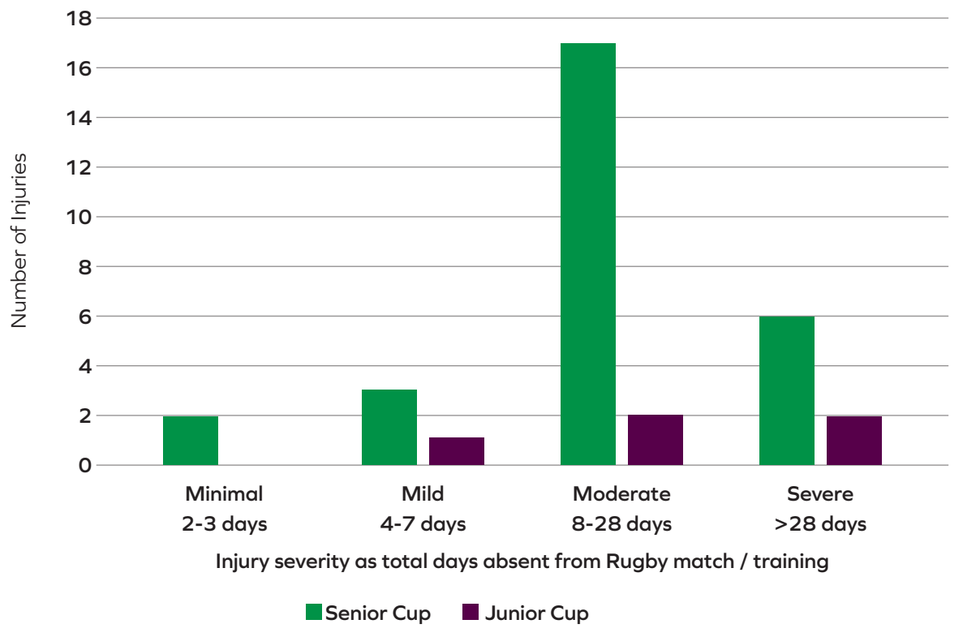

Figure 10: Training Injury severity (number of injuries)

[15] Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
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4.7 Training Injury Burden

The burden of an injury assesses the incidence of an injury in relation to the severity of the injury (reported as number of days absent/1000h).

Exposure was not measured in relation to training injuries, therefore days lost per 1,000 hours could not be calculated. Frequency of severe training injuries along with average total days off are reported.

Ankle Sprains accounted for 33% of all severe training injuries (>28 days absence) in the School Senior Cup and resulted in an average of 19 days absence from Rugby match or training activities.

Due to a low number of training injuries in the School Junior Cup, there were just two injuries that required greater than 28 days absence from play.

Table 10:[16] Frequency (%) of severe training injuries, average TDO (total days off)

	Injury Burden	Average Total Days Off
School Senior Cup	Ankle Sprains 2 (33%) Shoulder Dislocation 1 (17%) ACJ Sprain 1 (17%) Meniscal Tear 1 (17%) Tibia Fracture 1 (17%)	19 182 35 122 119
School Junior Cup	ACJ Sprain 1 (50%) Wrist Fracture 1 (50%)	46 44

[16] An 'ankle sprain' refers to a sprain of the ligaments either on the outside (anteriortalofi bular (ATFL) ligament) or the inside (deltoid ligament) of the ankle joint. An ATFL sprain is the most common type of ankle sprain.
A 'shoulder dislocation' refers to the complete separation of the upper arm bone (humerus) from the shoulder socket (glenoid fossa).
An 'ACJ sprain' (acromioclavicular joint sprain) refers to a tear of the ligaments that connect the collar bone (clavicle) to the shoulder (glenohumeral joint).
A 'meniscal tear' refers to a tear of the cartilage (meniscus) inside the knee joint.
A 'tibia fracture' refers to a break in the shin bone (tibia) at the front of your lower leg.
A 'wrist fracture' refers to a break in one or more of the bones in the wrist joint. A radius fracture is the most common type of wrist fracture.

4.8 Medical Attention Training Injuries (slight injuries)

Any injury resulting in 0-1 days absent from Rugby match or training is considered a slight, or 'medical attention' injury and therefore were excluded from the analysis of time-loss injuries, as per best international practice.[17]

During the 2019-2020 season there were two medical attention training injuries in the School Senior Cup however, no medical attention injuries occurred in the School Junior Cup.

The diagnoses for the medical attention training injuries in the School Senior Cup included an overuse Hip/Groin muscle strain and an overuse Hamstring Strain. Both occurred during non-contact training drills.

[17] Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
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5.0 Future Directions

Following two successful seasons of the IRISweb system implementation in Schools' Rugby, the IRIS project will expand recruitment of schools for the 2020/2021 season, particularly into the Junior Cup section.

Proving the IRISweb system's validity, accuracy and manageability by schools, clubs and medical professionals is paramount. Proving its reliability and efficiency is essential at this structured school level to enable future planned roll-out across all levels of School Rugby.

6.0 Publications and Conferences

6.1 Journal Publications

Griffin, A., Kenny, I.C., Comyns, T.M. and Lyons, M. (2020). Training load monitoring in amateur Rugby Union: A survey of current practices. The Journal of Strength and Conditioning Research. 2020 May [in press]

Griffin, A., Kenny, I.C., Comyns, T.M. and Lyons, M. (2020) The Relationship Between the Acute:Chronic Workload Ratio and Injury and its Application in Team Sports: A Systematic Review. Sports Medicine. 50(3), 561-580.

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6.2 Conference Communications

Griffin, A., Kenny, I.C., Comyns, T.M. and Lyons, M. (2020). Training load monitoring in amateur Rugby Union: A survey of current practices. Accepted for presentation at the European College of Sport Science Conference 2020, October 2020, Prague, Czech Republic.

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Leahy T.M., Kenny I.C., Campbell M.J., Warrington G.D., Cahalan R., Harrison A.J., Lyons M., Glynn L.G., and Comyns T.M. (2019) Injury Surveillance in School Rugby Union in Ireland. Proceedings of the SASMA South African Sports Medicine Association BRICSCESS BRICS Council of Exercise and Sports Science 2019 Congress. 10-13 October 2019, Cape Town, South Africa.

Yeomans, C., Kenny, I.C., Cahalan R., Costello V., Warrington G.D., Cahalan R., Harrison A.J., Lyons M., Glynn L.G., and Comyns T.M. Relationship between physical and wellness baseline screening measures and seasonal amateur Rugby injury. ACSM Annual Conference. Florida. May 2019.

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